

## CLAIMS

What is claimed is:

1. A method, comprising:
  - receiving packet fragments at an entry point;
  - determining if a packet fragment received at the entry point is a head fragment or a non-head fragment;
  - if the received packet fragment is a non-head fragment:
    - determining if a helper session associated with a head fragment corresponding to the non-head fragment is present,
    - updating the non-head fragment with routing information from the helper session, and forwarding the non-head fragment based on the routing information from an exit point; and
    - otherwise storing the non-head fragment if the helper session is not present, and waiting for the corresponding head fragment to be received at the entry point; and
  - if the received packet fragment is the head fragment:
    - processing the head fragment; and
    - at the exit point, updating any stored corresponding non-head fragment with routing information obtained as a result of processing the head fragment and forwarding the updated non-head fragment from the exit point.
2. The method of claim 1 wherein processing the head fragment includes generating a session pointer data structure having the routing information, the method further comprising at the exit point after processing the head fragment:
  - locating the session pointer data structure that was generated during the processing of the head fragment;

generating the helper session based on the routing information from the session pointer data structure; and

using the routing information in the generated helper session to update any stored corresponding non-head fragment or a corresponding non-head fragment subsequently received at the entry point.

3. The method of claim 1 wherein receiving packet fragments at the entry point comprises receiving IP-fragmented packets.

4. The method of claim 1 wherein the head fragment includes substantially all header information from its original packet, and wherein the non-head fragment includes relatively less of the header information from the original packet.

5. The method of claim 1 wherein both the head and non-head fragments contain duplicative header information from their original packet, the method further comprising:

processing one of the fragments having the header information as the head fragment; and

designating another one of the fragments having the header information as the non-head fragment.

6. The method of claim 1 wherein updating the non-head fragment with routing information from the helper session includes updating source and destination address fields of the non-head fragment.

7. The method of claim 1 wherein updating the non-head fragment with routing information from the helper session includes adding a routing tag to the non-head fragment.

8. The method of claim 1 wherein processing the head fragment includes processing the head fragment according to at least one of Layer 4 through Layer 7 criteria.

9. A method, comprising:  
determining if a fragment is either a head fragment or a non-head fragment;  
processing the fragment if it is a head fragment, including generating routing information; and  
applying the routing information to any corresponding non-head fragment that is received subsequently after the head fragment and to any corresponding stored non-head fragment that is received prior to the head fragment.

10. The method of claim 9, further comprising forwarding the non-head fragments having the routing information applied thereto, without processing these non-head fragments similarly to the head fragment.

11. The method of claim 9, further comprising:  
generating a session associated with the head fragment;  
obtaining the routing information from the session and applying the routing information obtained therefrom to any corresponding non-head fragment received subsequently after the head fragment; and  
storing any corresponding non-head fragment if the session has not been generated and subsequently applying the routing information to these stored non-head fragments after the session has been generated.

12. The method of claim 9 wherein applying the routing information to the non-head fragments includes updating source and destination fields of these fragments.

13. An article of manufacture, comprising:  
a machine-readable medium having instructions stored thereon to:  
determine if a fragment is either a head fragment or a non-head fragment;  
process the fragment if it is a head fragment, including instructions to  
generate routing information; and  
apply the routing information to any corresponding non-head fragment that  
is received subsequently after the head fragment and to any corresponding stored  
non-head fragment that is received prior to the head fragment.

14. The article of manufacture of claim 13 wherein the machine-readable medium further includes instructions stored thereon to forward the non-head fragments having the routing information applied thereto, without processing these non-head fragments similarly to the head fragment.

15. The article of manufacture of claim 13 wherein the machine-readable medium further includes instructions stored thereon to:  
generate a session associated with the head fragment;  
obtain the routing information from the session and apply the routing information obtained therefrom to any corresponding non-head fragment received subsequently after the head fragment; and  
store any corresponding non-head fragment if the session has not been generated and subsequently apply the routing information to these stored non-head fragments after the session has been generated.

16. The article of manufacture of claim 13 wherein the instructions to apply the routing information include instructions to apply a routing tag to the non-head fragments.

17. A system, comprising:

a means for determining if a fragment is either a head fragment or a non-head fragment;

a means for processing the fragment if it is a head fragment, including a means for generating routing information; and

a means for applying the routing information to any corresponding non-head fragment that is received subsequently after the head fragment and to any corresponding stored non-head fragment that is received prior to the head fragment.

18. The system of claim 17, further comprising a means for forwarding the non-head fragments having the routing information applied thereto, without processing these non-head fragments similarly to the head fragment.

19. The system of claim 17, further comprising:

a means for generating a session associated with the head fragment;

a means for obtaining the routing information from the session and for applying the routing information obtained therefrom to any corresponding non-head fragment received subsequently after the head fragment; and

a means for storing any corresponding non-head fragment if the session has not been generated and for subsequently applying the routing information to these stored non-head fragments after the session has been generated.

20. A system, comprising:

an entry point to receive packet fragments;

a network device coupled to the entry point to determine if a packet fragment received at the entry point is a head fragment or a non-head fragment,

wherein if the received packet fragment is a non-head fragment:

the network device can determine if a session associated with a head fragment corresponding to the non-head fragment is present, update the non-head fragment with routing information

from the helper session, and forward the non-head fragment based on the routing information;

a storage unit coupled to the network device to store the received non-head fragment if the helper session is not present, and wherein the network device can wait for the corresponding head fragment to be received at the entry point;

wherein if the received packet is the head fragment, the network device can forward the head fragment to be processed by at least one feature; and

an exit point coupled to the network device, wherein any corresponding non-head fragment stored at the storage unit can be updated at the exit point with routing information that result from processing of the head fragment, and further wherein the updated non-head fragment and head fragment can be forwarded from the exit point.

21. The system of claim 20 wherein the network device comprises a switch.

22. The system of claim 20 wherein the entry and exit points comprise part of at least one software-based function.

23. The system of claim 20 wherein the feature to process the head fragment comprises at least one from a plurality of Layer 4 through Layer 7 features.

24. The system of claim 20 wherein the feature to process the head fragment is integrated in the network device.

25. The system of claim 20, further comprising at least another network device coupled to the exit point and having the feature to process the head fragment.

26. The system of claim 20, further comprising another storage unit, coupled to the exit point, to store the routing information from the helper session.

27. The system of claim 20, further comprising a software program to operate in conjunction with the network device to handle the non-head and head fragments.